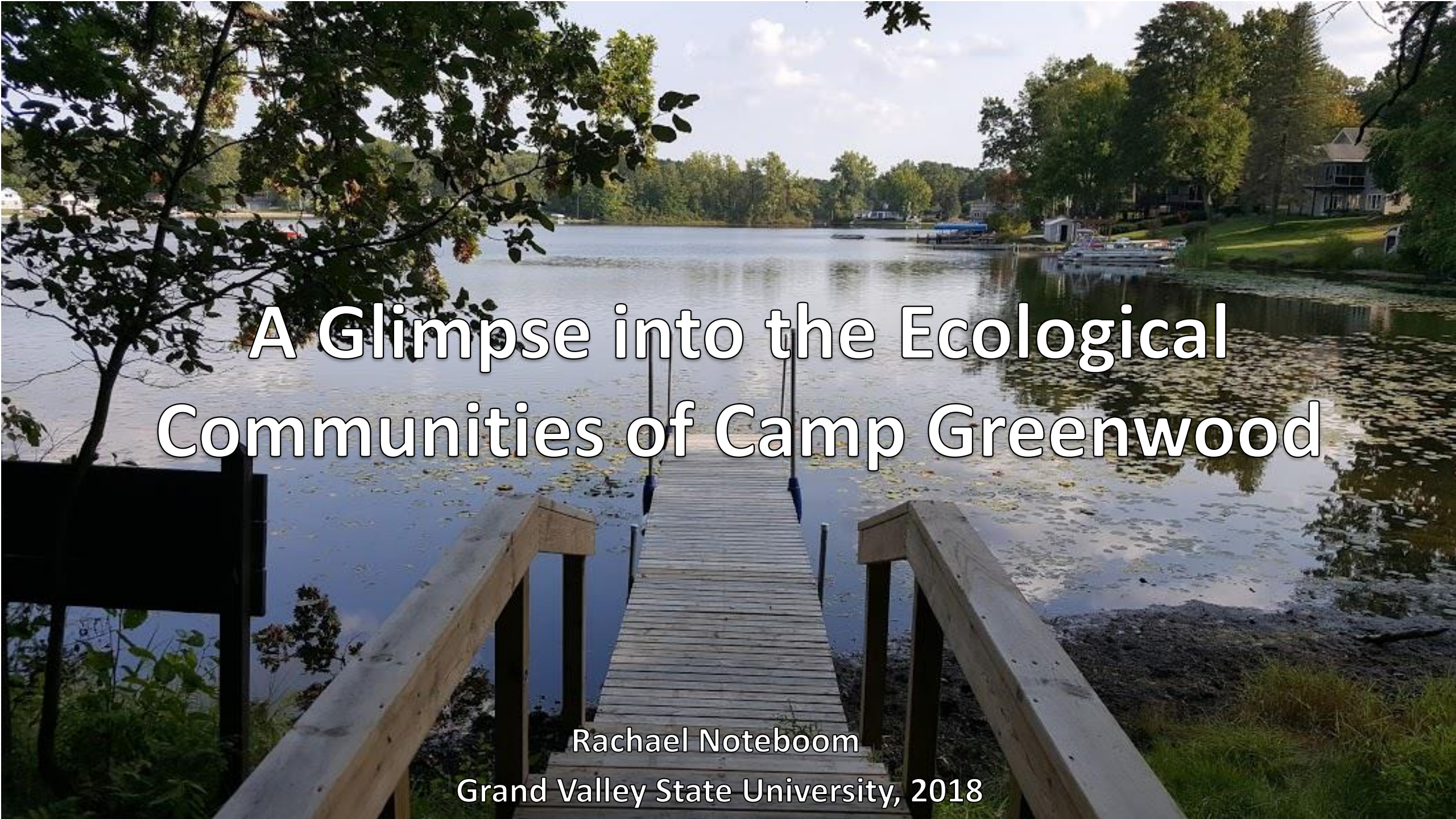
11-2018

A Glimpse into the Ecological Communities of Camp Greenwood

Rachael Noteboom
Grand Valley State University



A Glimpse into the Ecological Communities of Camp Greenwood

Rachael Noteboom

Grand Valley State University, 2018

Author's Note

Hello! My name is Rachael Noteboom and I have recently graduated from GVSU with a Bachelor's of Science in Biology. In order to finish my schooling with the Honor's College at Grand Valley, I needed to complete a "Senior Project". I struggled to come up with an idea for my final project, but I knew that it needed to be something meaningful. My father works at the First Presbyterian Church in Kalamazoo, and has been active in the actions to preserve Camp Greenwood. Through his connection, I've visited the camp many times to enjoy the peaceful scenery, and participated in Family Camp this past summer.

I have a deep love for the environment, and am fascinated by ecological cycles and the way that different species interact in an overall community. I knew this would be a prime study area to delve deeper into, and wanted to do something that could benefit the camp and those working so hard to keep it alive. The previous camp director, Suzanne Bates, gave me permission to do a study and although I definitely had some help, this was largely an independent project. I took a deeper look into the history of the camp, the importance of wetlands, the problem of invasive species, and made a few maps to show how the land cover has changed throughout time. I took pictures of many different species that I found, identified what they were, and tried to describe their ecological role within a few of the systems present in this area. The study is focused on the northern end of camp because it is home to the most biodiversity.

This land is very valuable, disregarding the large price tag it has to those who wish to sell it, due to the physical environment and importance of natural education. There are many plants, animals, fungi, bacteria, and other living beings that have a home in this camp, and contribute to its health and that of the surrounding area. As a biologist, I tend to focus on the scientific aspects of what is naturally going on, and see a real beauty in that. As a person, I had a wonderful time at Family Camp with my two rowdy young nephews and can see very clearly how important the camp activities and educational atmosphere is for children and adults alike. I listened to kids open up about their feelings on abstract and difficult concepts with such ease and profundity of response, and then also scream with delight a few minutes later as the ground magically turned into lava. This camp is a very special place to many people, and I hope to shed a light on a fraction of that importance by focusing on the ecology of the land. This is an unfinished product, and is something that could be continued for years to come.

"Camp Greenwood is a Christian camp whose mission is to build a community for all ages which encourages Christian growth, models acceptance of individual differences, and nurtures friendships in the out-of-doors as a place for encountering and enjoying God's good creation."

Above mission statement and other information available at http://campgreenwood.org/

Camp History

- Camp Greenwood has been around since 1950, and has been owned by the Lake Michigan Presbytery since 1975.

- Mascot Al E. Gator was officially created in 1980, closely following the popular “Gator Shuffle” song by Bud Thompson.

- The primary logo changed to a tree, dove, and stream in 2012.

- Activities such as Music in the Woods (later dissolved into Arts in the Woods in 2003) and Family Camp have been added and adjusted throughout the years with a very positive response.

- Numerous camp buildings for wilderness experience, nature education, dining, housing, and more have been staples of the camp, improved over the years.

- The Greenwood Alumni Gator Association (GAGA) formed in 2014 and the Greenwood Ministries Association (GMA) formed in 2015 have been active in working towards a brighter future for the camp.

THE GREENWOOD GATOR SHUFFLE

by

G.M. (Bud) Thompson

There is a story you might have heard
That you may think is entirely absurd
About what's livin' at the bottom
of Woodbeck Lake, they say.
But you know you'll never spot 'em
Because they live at the very bottom
And they never show themselves
in the light of the day.

But late at night, while you are sleepin',
Out of the water they come a-creepin'
Onto the shore, where they
line up one-two-three.
Then the leader turns to the others
And says, "Now, sisters and brothers,
It's time to do
The Greenwood Gator Shuffle with me."

They sing, "I am the Greenwood Gator
And you won't find one any greater.
I'll plant you now and dig you later, yessiree.
So if you go down to the water
Be sure and do what every Gator oughta
And you can do
The Greenwood Gator Shuffle with me."

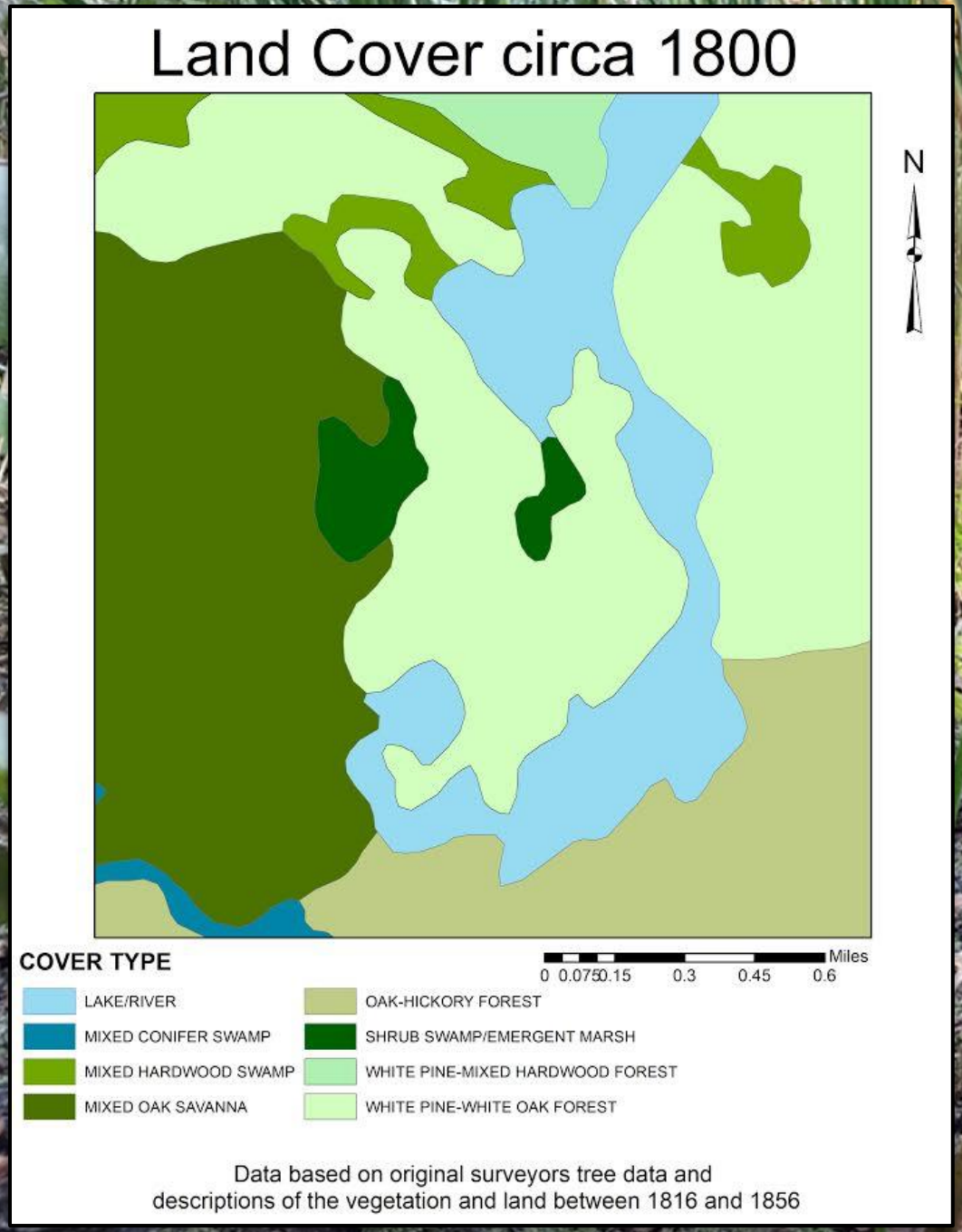
So they dance there in the moonlight
Where they know it will be soon light
And back into the mirky, mucky
water they'll climb.
But before the dawn is breakin'
And the people start to waken,
They get their alligator tales
a-shakin' one more time.

They sing, "I am the Greenwood Gator
And you won't find one any greater.
I'll plant you now and dig you later, yessiree.
So if you go down to the water
Be sure and do what every Gator oughta
And you can do
The Greenwood Gator Shuffle with me."

Now, some friends of mine who were sluggish
Ended up as someone's set of luggage.
A cousin of mine says it's a drag
To go through life as someone's shoes and bag.
But here at Greenwood we've got it made,
Dancin' nights and sleepin' days in the shade.
Sippin' our frosty Gatorade
And singin' our alligator serenade:

They sing, "I am the Greenwood Gator
And you won't find one any greater.
I'll plant you now and dig you later, yessiree.
So if you go down to the water
Be sure and do what every Gator oughta
And you can do
The Greenwood Gator Shuffle with me."

I'm a Gator, he's a Gator,
she's a Gator, we're a Gator.
Wouldn't you like to be a Gator too?
I'm a Gator, he's a Gator,
she's a Gator, we're a Gator.
Wouldn't you like to be a Gator too?
Be a Greenwood Gator.
Be a Greenwood Gator.
Wouldn't you like to be a Gator too?
Wouldn't you like to be a Gator too?
Wouldn't you like to be a Gator...
Two, three, four, five, six, seven, eight, nine...
ROAR!



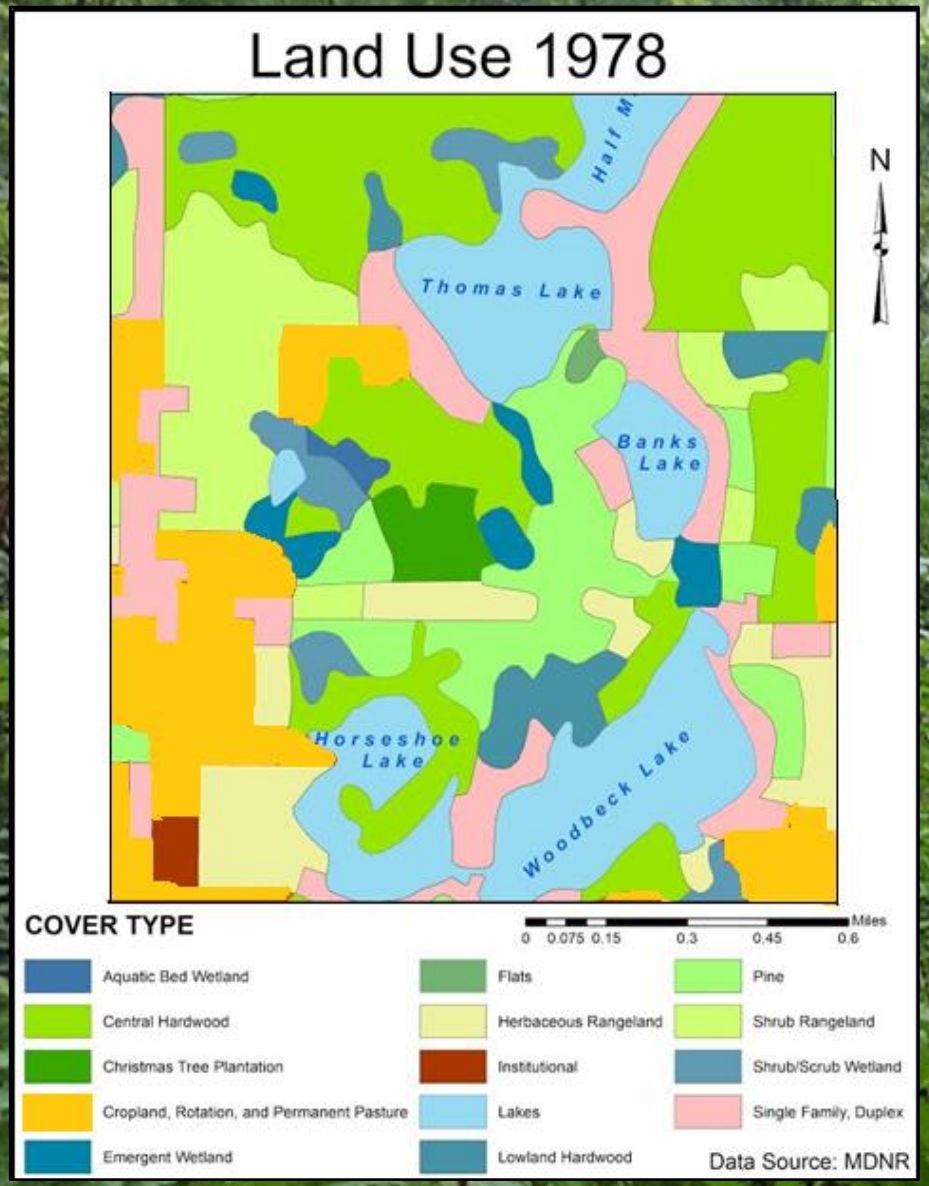
History of the Land

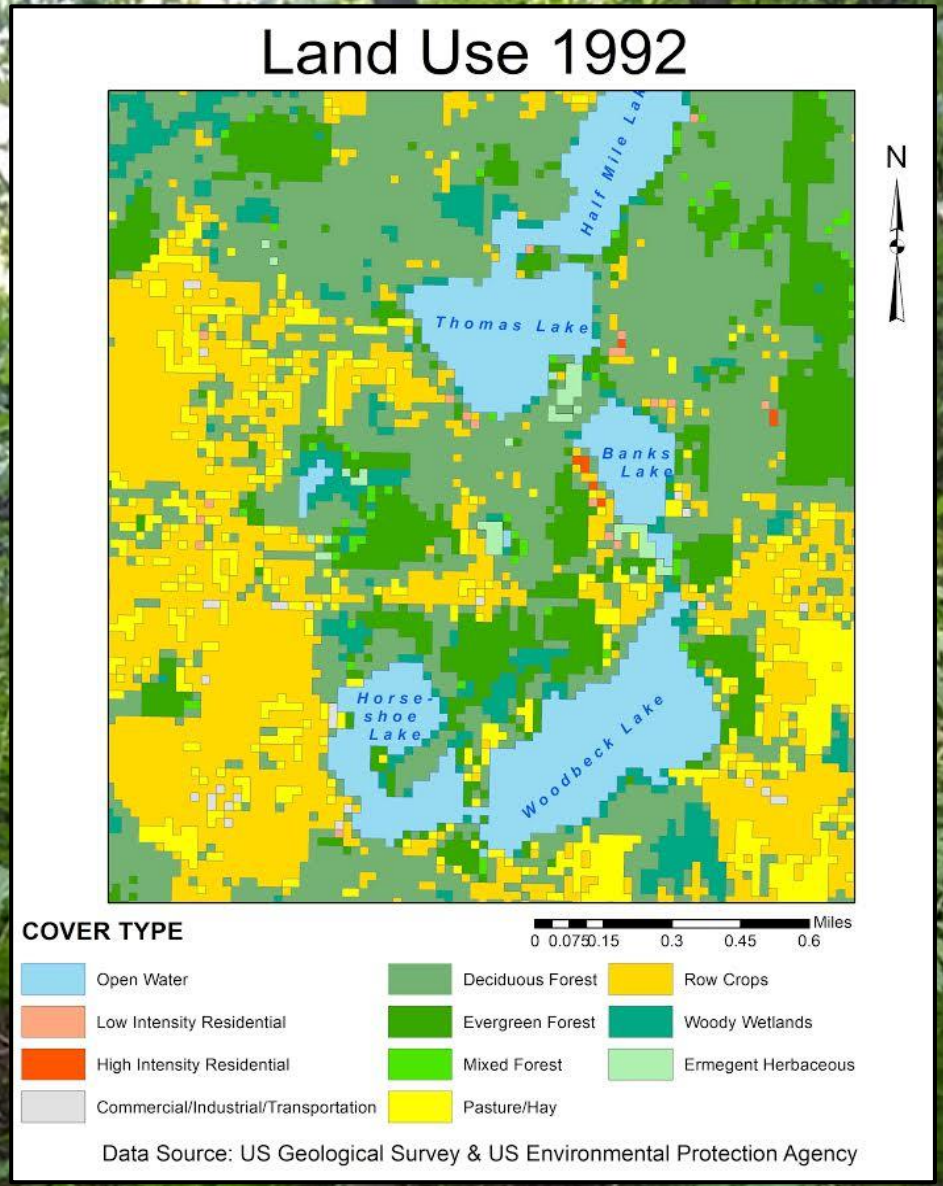
Historically, the land within the camp has been mainly a white pine/white oak forest with an emergent marsh/shrub swamp area, with the surrounding water flushing out into the forested land. White pine/white oak forests typically have slightly dry to mesic (moist) soil, with a closed canopy composed of both deciduous trees and pines.

There are known areas of the camp that are considered to be *wetlands*, which is simply described as an area of land with water covering the soil, either year-round or only during specific times of the year. A shrub swamp/emergent marsh system fits this description, with seasonal flooding and well-decomposed muck and mineral soils.

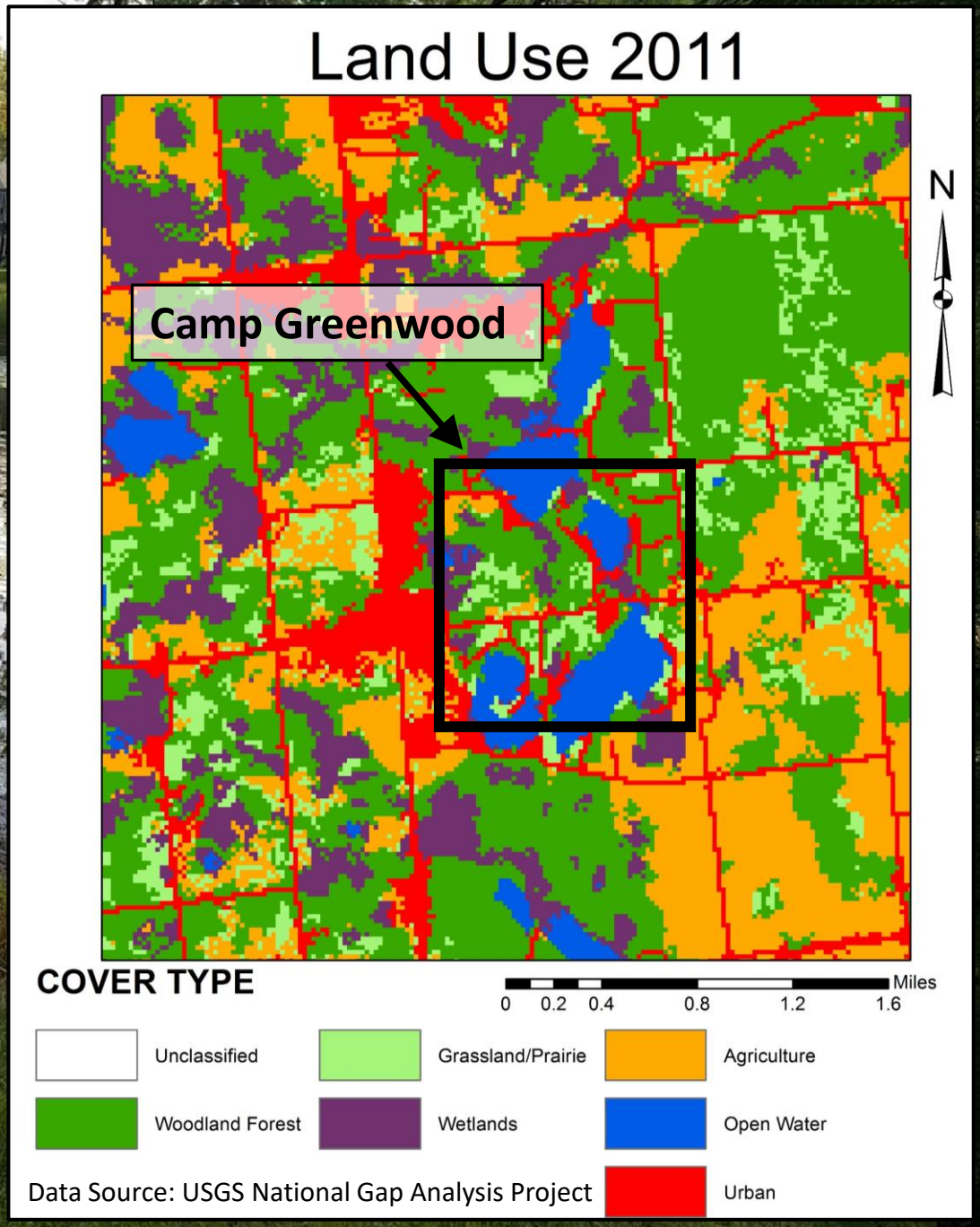
Now known as separate lakes, the camp was previously partially surrounded by one large and somewhat narrow body of water. Today, there are land bridges that keep the inner area less isolated.

As time moved forward, there has been increased development of land for agriculture, livestock, residential, and commercial uses.



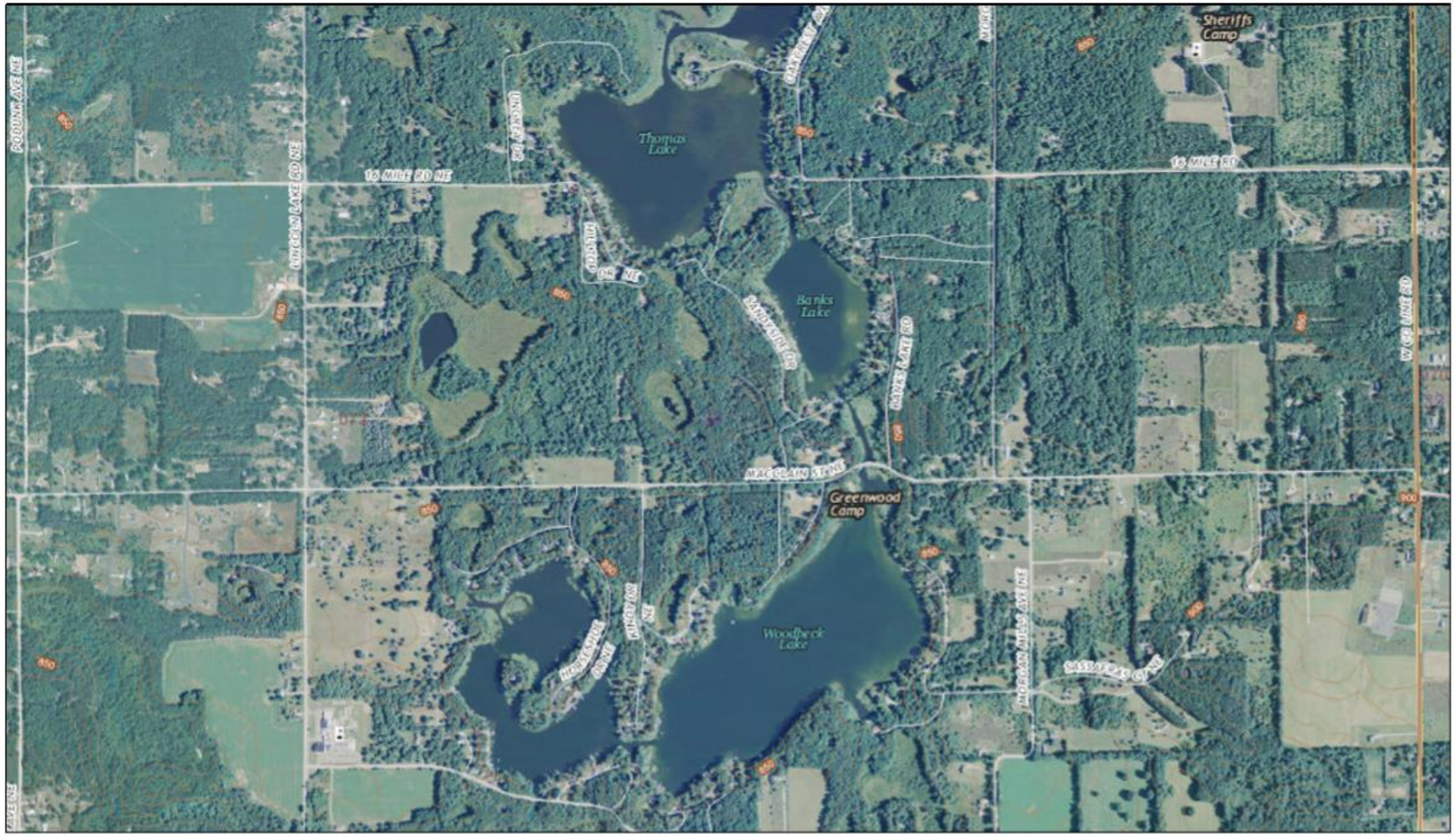


Data from 2011 shows many natural forests and local wetlands in the surrounding area near the camp. Urbanization has also increased, and there has been further development around the camp area in the past several years.



2015 aerial imagery shows that there is a strong juxtaposition of densely forested natural areas within and around the camp, sitting amidst the overall community grid surrounded by flat, straight-edged areas of agriculture and development.

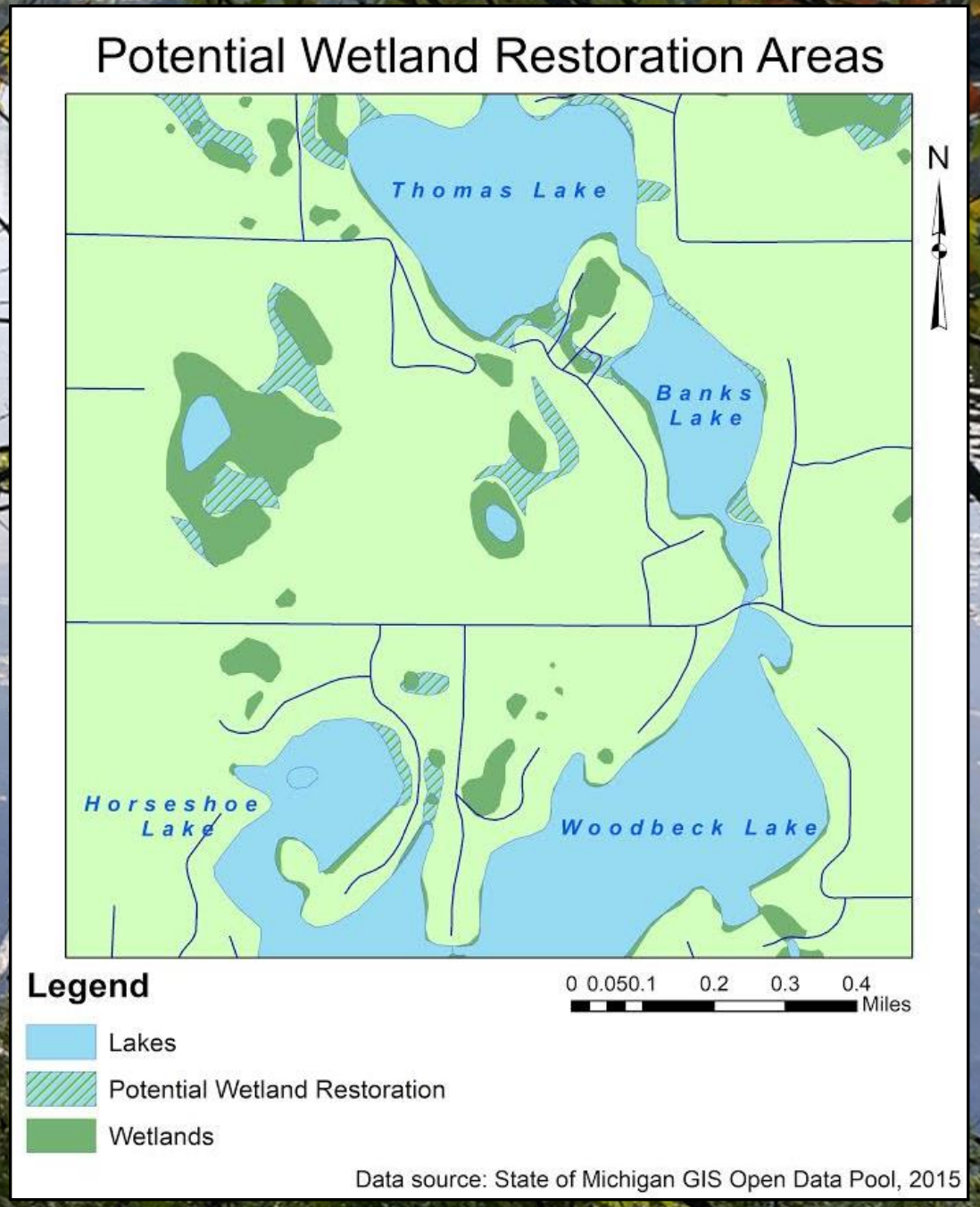
Environmental Mapper



Wetlands & Restoration

Wetlands are important because they act as a buffer between the land and water. These areas reduce the impacts of floods or other storm surges, and improve water quality by absorbing pollutants. Adding an aquatic aspect to a terrestrial system allows a larger number of different species to thrive, and is often home to rich ecological communities. According to the State Department of Environmental Quality, there are at least 33 different types of wetlands in Michigan, and 26 of these are considered to be rare - partially due to naturally unique hydrology, but mainly due to anthropogenic (human) influences.

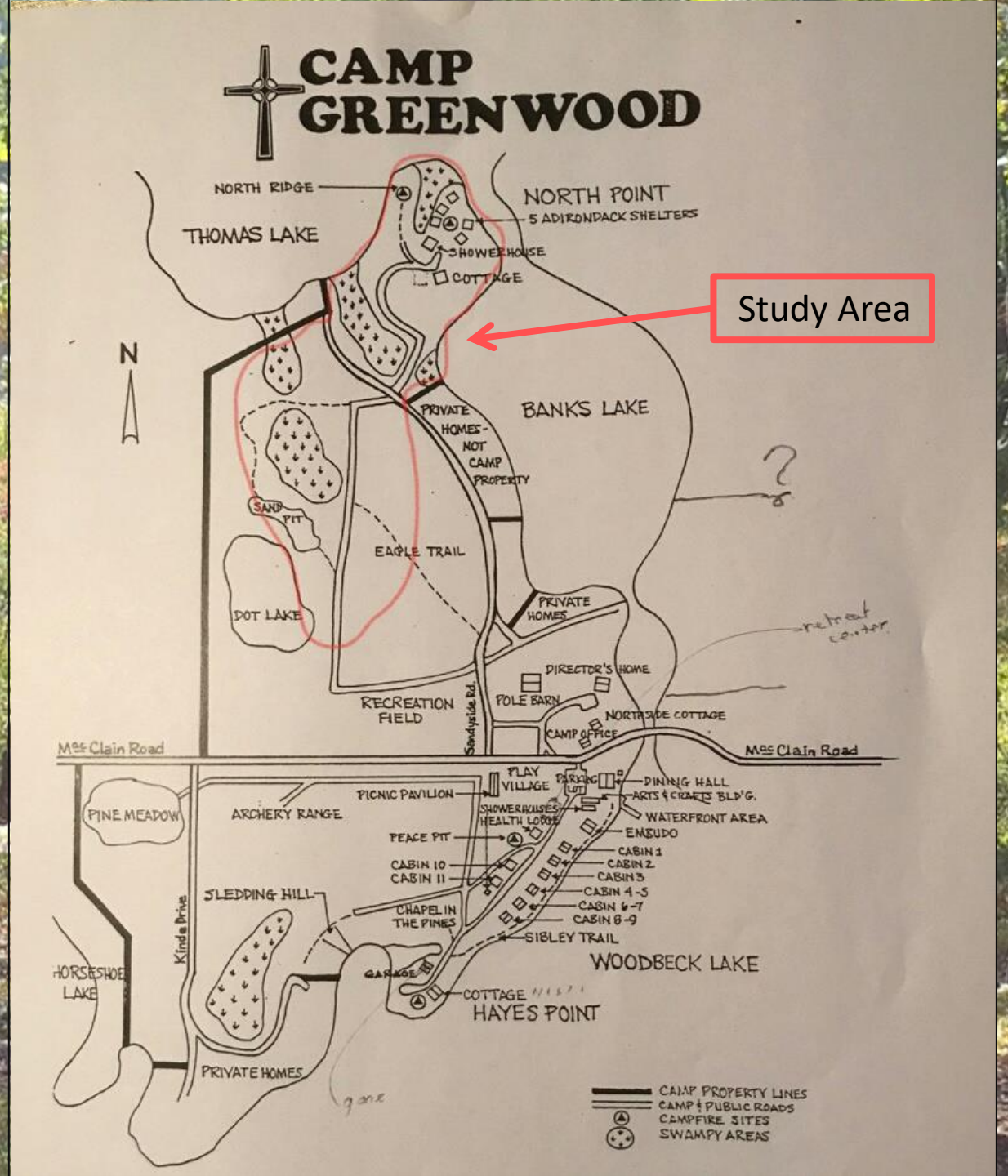
There are some areas of the camp that previously were wetlands and could potentially revert back if there are persistent restoration efforts. The methods for restoring an area vary depending on the specifics of the land, but always begin with initial protection of the current habitats and assessment of the natural communities.



North Point

North Point is at the, you guessed it, northern edge of the camp's property. This is the area with the most ecological diversity, and is home to beautiful trails that go through forested stands and swampy areas. The shelters at this part of camp are much more basic than the typical cabins, and for that reason it is where Boy Scouts and the highly adventurous choose to stay.

The study area was constrained mostly to this section of camp, because wetlands are known to be some of the most productive ecological systems on the planet, providing a suitable environment for a wide range of species. This part of camp is also adjacent to both Thomas and Banks Lakes, and borders highly developed areas with large private homes. When complex ecological communities interact with starkly contrasting urbanized zones, there are bound to be consequences down the line.



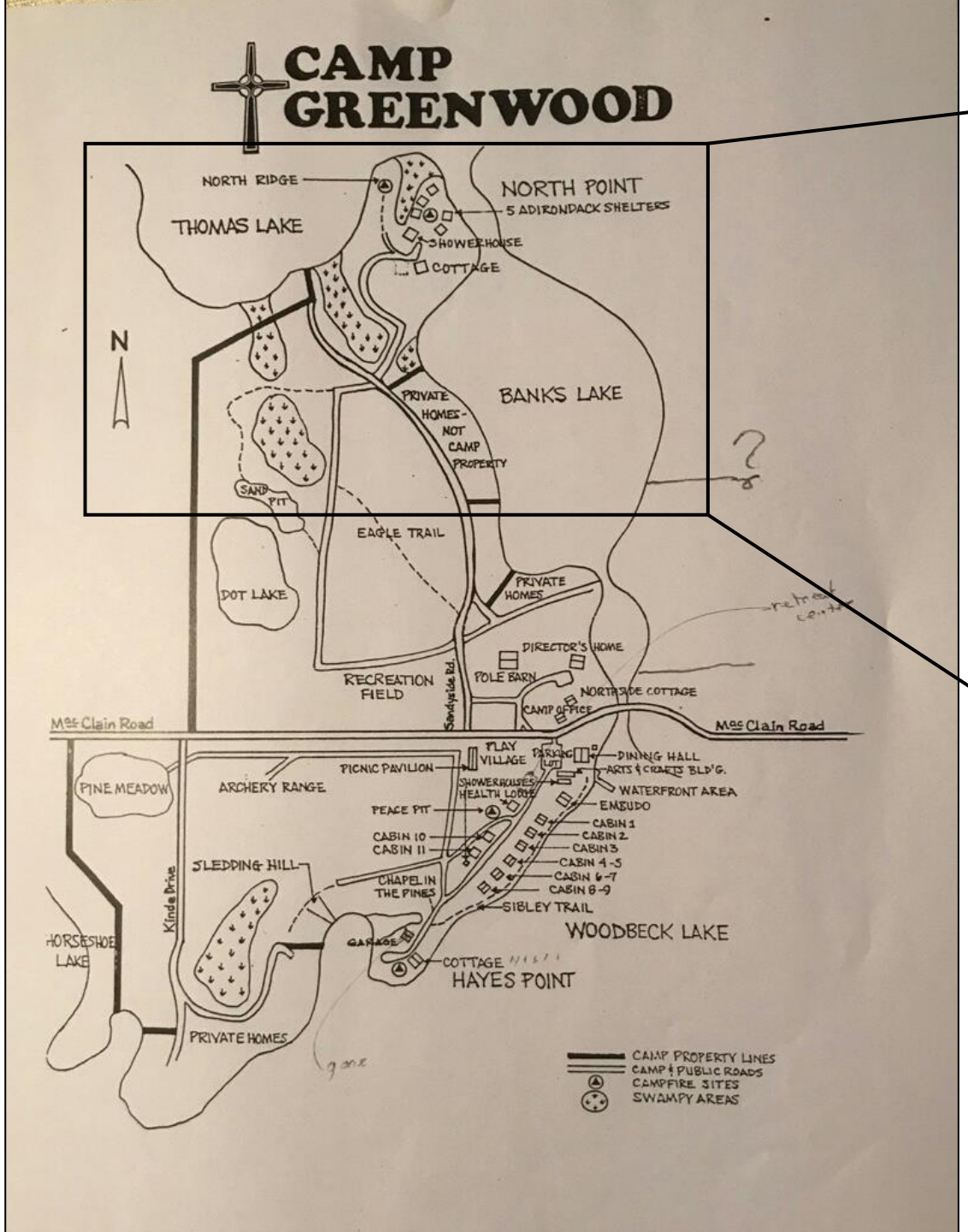
Invasive species

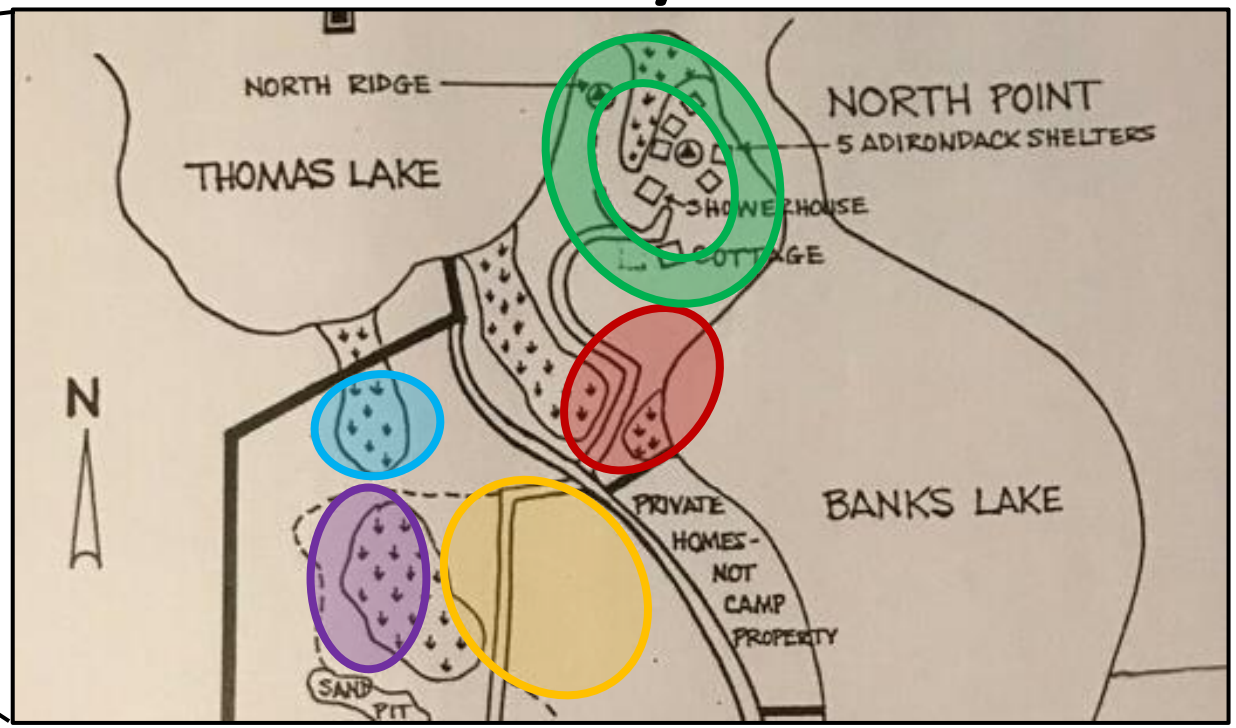
In an ecosystem, every organism has a niche, or a specific role within the overall community. Some of the species listed are considered to be non-native to Michigan. Basically, this means that they have been introduced to the ecosystem and the other organisms in the area may have not yet adapted to their presence. There are many species that have traveled and don't cause problems, but they become considered *invasive* when they outcompete the native species for their access to resources, and don't typically have natural predators to restrict their populations. They can end up taking over an area, and we can lose some original species, which has an effect on the overall community.

How did they get here? A lot of times people bring 'exotic' non-native plants to use for decoration in their homes or in landscaping around their house. Along with that, birds that travel around can eat a plant in one area, and then come to a different area and deposit the seeds. If the habitat is conducive to that seedling's survival, the plant can grow and then rapidly reproduce in the new area.

So what can we do about this? There isn't really a whole lot that we can do, unfortunately. This is a widespread issue that shows no sign of slowing down. The way you can help is by recognizing which species are invasive, and physically removing them. Also, if the ecosystem is healthy overall, it has a better chance at resisting invasive threats. The best thing to do is protect the land and be vigilant of what different plants or other organisms are hitch-hiking with you.

Zones of Study



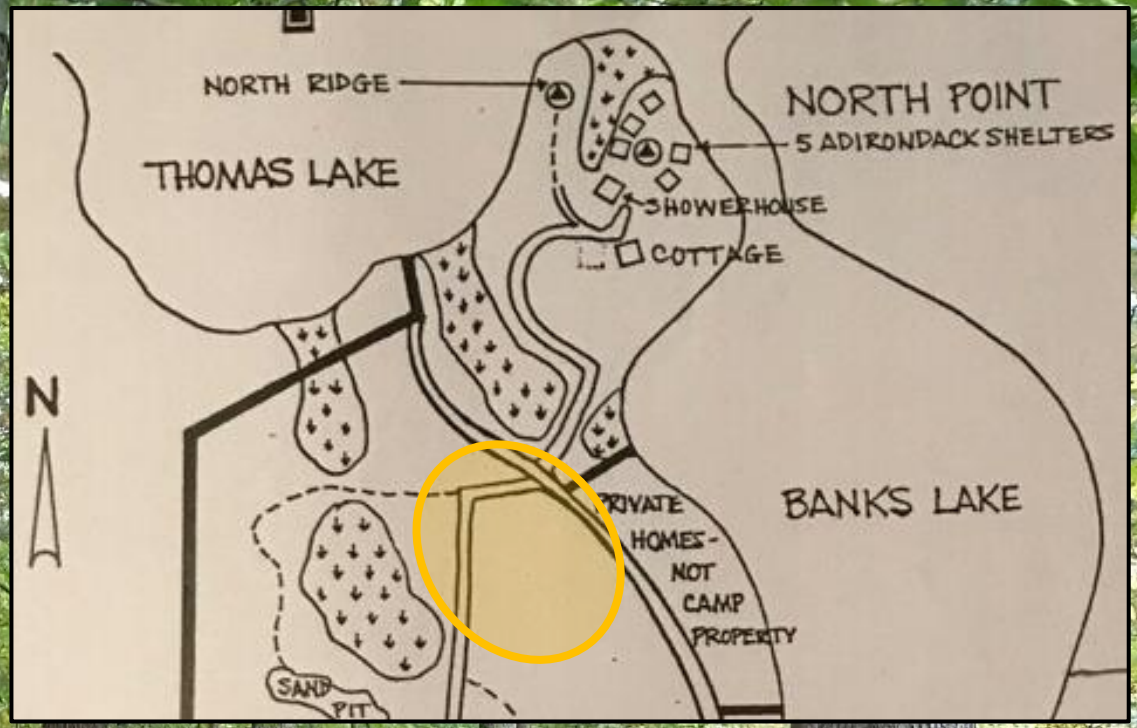


Although many of the same species were found in multiple areas, there were some distinct regions with differential habitat features. I have separated this northern end of camp into five zones, and listed some of the specific species that help characterize the area.

1. Inland
2. Near the Shore
3. North Point Midland
4. By the Border
5. Southern Swamp

1. Inland

This zone is further inland from the water, and has a relatively high elevation compared to the rest of the camp. It has been historically characterized as a Laurentian-Acadian Northern Pine-Oak Forest, an ecological forest system found in the Midwest, north-eastern parts of the US, and some parts of Canada. There is a thick canopy blocking the sunlight from smaller plants, leading to minimal growth in the understory. The soil is less moist than the marshy areas, typically loamy to sandy, and there is an abundance of leaf litter from the deciduous trees.



Bedstraw
Galium sp.

- **Family:** Rubiaceae

- **Typical Habitat:** open oak, hickory, aspen woodlands, pine woodlands, fields, meadows, prairie remnants, fens, tamarack swamps, thickets, and along ditches, rivers, and lake banks

- **Why it matters:** This type of vegetation is associated with the ideal habitat of moose and elk, and it also may be an important food source for rodents.

Japanese Spurge
Pachysandra terminalis

- **Family:** Buxaceae

- **Typical Habitat:** prefers a moist, well-drained, acidic, rich soil in full shade

- **Why it matters:** This plant is native to Japan, but has appeared in Michigan because it is a common decorative plant for landscaping. It stays low to the ground and creates dense mats, commonly referred to as a ‘Green Carpet’.

Goldenrod
Solidago sp.

- **Family:** Asteraceae

- **Typical Habitat:** There are many different species of goldenrod that can habitat assorted areas, especially disturbed areas of moist to dry prairies, openings in both floodplain and upland forests, thickets, savannas, limestone glades, and gravel seeps.

- **Why it matters:** These flowers are a food source for many Lepidoptera (butterfly and moth) larvae, and even woodpeckers will pick at them. Bees, wasps, flies, beetles, and other insects will come to the flower for nectar or pollen, some birds eat the seeds, and small mammals will eat the foliage.

Sassafras
Sassafras albidum

- **Family:** Lauraceae

- **Typical Habitat:** dry sandy forests (especially oak), often on old dunes; fence-rows; mixed deciduous forests and swamps

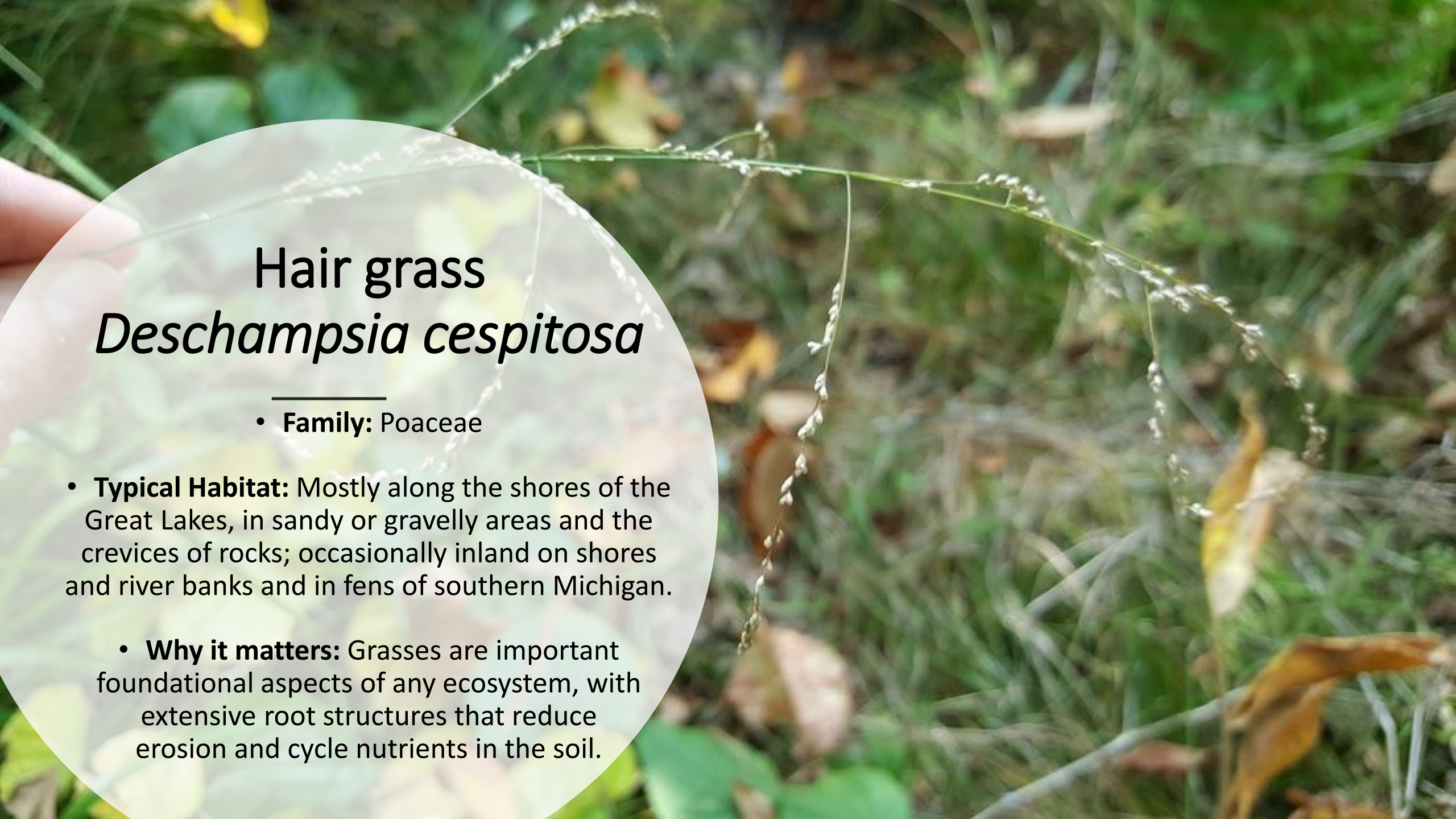
- **Why it matters:** Sassafras oils have been used by Native Americans in tonics and medicines, the bark has been used for tea, the root oil used for root beer flavoring, and the stem pith has been used as a gumbo-thickening agent in the Southern US. Recently, the FDA has banned the use of sassafras oils as it has been found to contain a carcinogenic agent, safrole.

Reed Canary Grass
Phalaris arundinacea

- **Family:** Poaceae

- **Typical Habitat:** wetlands/riparian areas; marshes and wet shores, borders of streams and ponds, in ditches

- **Why it matters:** The species can form dense stands that completely choke out other vegetation. It is becoming a serious problem in the wetlands of southern Michigan especially.



Hair grass
Deschampsia cespitosa

- **Family:** Poaceae

- **Typical Habitat:** Mostly along the shores of the Great Lakes, in sandy or gravelly areas and the crevices of rocks; occasionally inland on shores and river banks and in fens of southern Michigan.

- **Why it matters:** Grasses are important foundational aspects of any ecosystem, with extensive root structures that reduce erosion and cycle nutrients in the soil.

Aster
Symphyotrichum sp.

- **Family:** Asteraceae

- **Typical Habitat:** edges of moist forests, thickets, marshes; swamps (cedar and other conifers, hardwoods), wet hollows, fens, sedge meadows, shores, swales, ditches, stream and river banks

- **Why it matters:** These flowers are mainly insect pollinated, attracting bees and butterflies with their colorful and fragrant flowers. They are also a food source for many Lepidoptera larvae, and can be resistant to droughts.

Yucca
yucca flaccida

- **Family:** Agavaceae

- **Typical Habitat:** Sunny, dry, sandy sites mostly in the southwestern part of the state.

- **Why it matters:** This is a non-native species, originally from the southeastern United States.

American Beech
Fagus grandifolia

- **Family:** Fagaceae

- **Typical Habitat:** Typical of beech-maple forests and hemlock-white pine-northern hardwoods. Thrives especially on islands and along the Lake Michigan shore where favored by moist winds.

- **Why it matters:** Beech nuts are important food for wildlife, although they are only prominent every few years. Unfortunately, Beech Bark Disease is spreading throughout North America, roughening the naturally smooth bark and killing trees.

Tent Caterpillar Nest *Malacosoma americanum, disstria*

- **Family:** Lasiocampidae

- **Typical Habitat:** The preferred trees for nesting are fruit trees such as peach, cherry, plum, and apple, but other broadleaf trees and shrubs are used as well.

- **Why it matters:** This looks like a potential tent caterpillar nest. There are two species native to Michigan, and can be considered a pest when the population is at peak capacity. Despite being a nuisance, the caterpillar itself is a nutritious food source for 60 bird species, and have a long list of other predators including: large moths, frogs, mice, bats, reptiles, squirrels, skunks, and bears.

St. John's-Wort
Hypericum sp.

- **Family:** Hypericaceae
- **Typical Habitat:** marshy ground, swamps, moist sandy or mucky shores, dry to moist fields
- **Why it matters:** Some of the species in this genus are medicinal crop plants, with anti-viral, anti-depressive, and anti-cancerous properties.

Autumn Olive
Elaeagnus umbellata

- **Family:** Elaeagnaceae

- **Typical Habitat:** forest edges, meadows, open woods, pastures, riverbanks, roadsides, streams, disturbed areas

- **Why it matters:** This is an invasive plant that grows and spreads fast, outcompeting native plants and creating dense stands that block the sun from plants in need of high levels of light. It also can fix nitrogen from the atmosphere, which allows it to live in areas with poor soil conditions and alters the nitrogen cycle of the current ecosystem. It germinates very easily and local birds greatly aid in its seed dispersal.

Wild leek
Allium burdickii

- **Family:** Alliaceae

- **Typical Habitat:** rich forests, often on floodplains, but also occasionally in upland oak-hickory and rich deciduous forests of other kinds

- **Why it matters:** When flowering, this plant provides nectar and pollen to bees and flies. Although mammalian herbivores tend to avoid eating the foliage, many insects feed on the onion bulb.

Blue Spruce
Picea pungens

- **Family:** Pinaceae

- **Typical Habitat:** Native to the Rocky Mountains area, but commonly used as an ornamental in other areas. Prefers rich, moist, soils and full sun, but is tolerant of light shade.

- **Why it matters:** There are two fungi that currently are negatively affecting the blue spruce in Michigan: *Rhizosphaera* and *Stigmina*. The latter is still relatively new, but the former is known to cause a serious needle casting disease, in which many needles will turn purple/brown, die, and fall off the trees.

Common mullein, flannel plant *Verbascum thapsus*

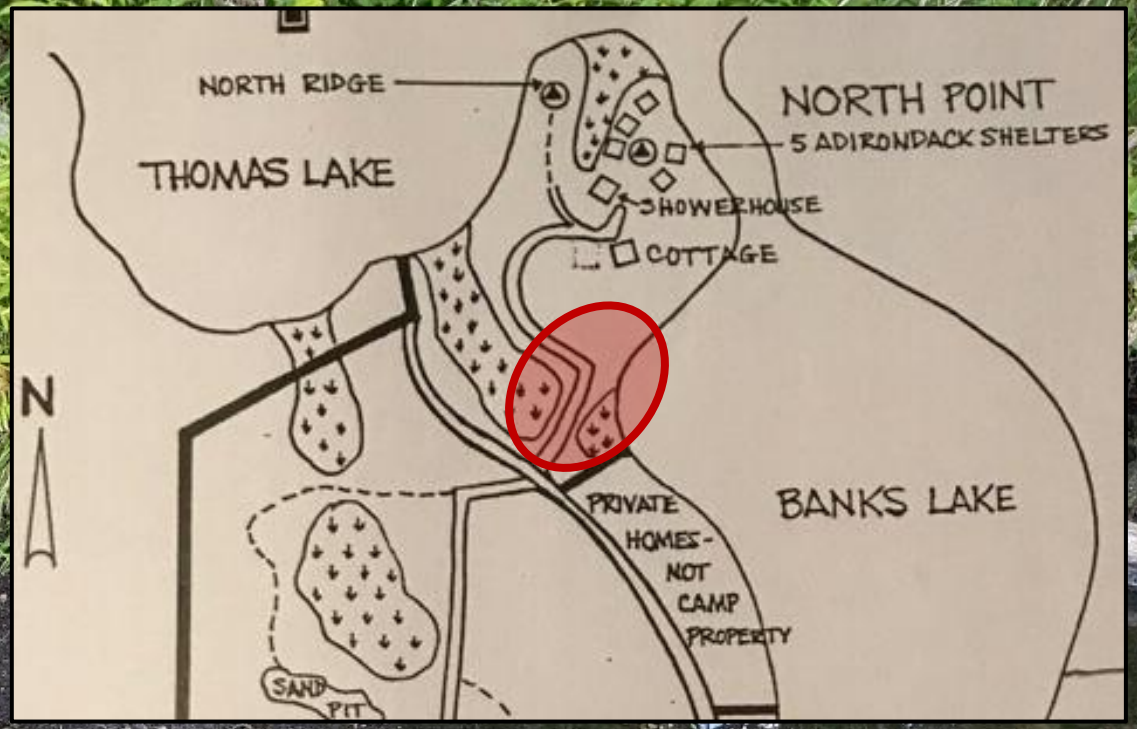
- **Family:** Scrophulariaceae

- **Typical Habitat:** disturbed ground, including filled land, vacant lots, clearings; roadsides and railroads; shores and open banks

- **Why it matters:** This is a non-native plant to North America, and is considered a noxious weed in 46 states. It is also classified as an obligate upland plant in the Midwest, almost never occurring in wetlands. Although it was not found directly in the marshy areas of North Point, it is concerning that an invasive weed like this is able to spread to areas previously thought secure.

2. Near the Shore

Along the dock recently built by North point, there were some interesting species right by the shoreline and in the water. Nearby, there were two smaller marshy areas on the border of the lake that are home to some unique plants and animals. This is the area that appeared to have the most biodiversity, with many brightly colored flowers that attract important butterfly pollinators. This area has been historically associated with a hardwood conifer mesic forest, but appears to be more of a small marsh filled with dense shrubbery and a mucky ground.

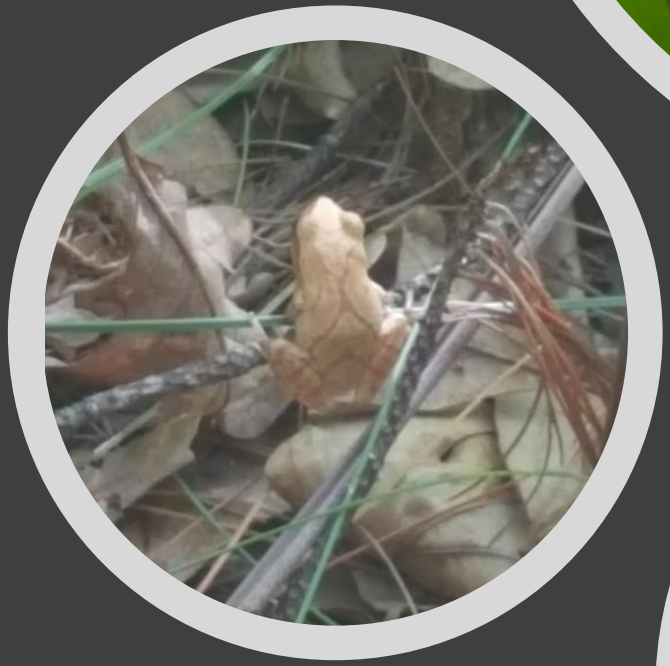


Spring Peeper frog
Pseudacris crucifer

- **Family:** Hylidae (subfamily: Hylinae)

- **Typical Habitat:** These frogs need still water to lay their eggs, and are predominately found in marshy areas. They like to hibernate under fallen logs or debris, choosing wooded wetlands or swampy forests above other areas.

- **Why it matters:** The mating season is in early spring, so the frogs will begin chirping during that time to signify warming temperatures to other organisms in the area. Also, these amphibians can actually allow 70% of their bodies to freeze during the winter, allowing for survival in the cold months in Northern North America.



Common Greenshield Lichen
Flavoparmelia caperata

- **Family:** Parmeliaceae

- **Typical Habitat:** Grows mainly on the bark of trees, occasionally on rocks.

- **Why it matters:** Lichens are an interesting aspect of an ecosystem, actually composed of two symbiotic organisms: an alga and fungus. Lichens can absorb materials in the atmosphere, particularly heavy metals, carbon, sulfur, or other pollutants, and can provide scientists with a good subject to test for air quality.

Closed Gentian, Bottle Gentian
Gentiana andrewsii

- **Family:** Gentianaceae

- **Typical Habitat:** marshy or at least moist ground; meadows and wet prairies; shores, thickets, and ditches; river banks, floodplains, swamps

- **Why it matters:** This species is a good source of nectar for bees, as they are the only pollinators strong enough to get inside of the corolla. Some Gentians are also used medicinally as an herbal remedy to reduce fever and inflammation.

Sweet-scented water lily *Nymphaea odorata*

- **Family:** Nymphaeaceae

- **Typical Habitat:** Found in ponds and sheltered areas of lakes and rivers, with the mature leaf blades all floating on the surface of the water.

- **Why it matters:** Other than adding to the beauty of nature with its stunning flower, this plant attracts birds and can be a food source for local mammals.

Spicebush
Lindera benzoin

- **Family:** Lauraceae

- **Typical Habitat:** moist rich deciduous forests and swamps

- **Why it matters:** Humans can use this plant to make a tea from the leaves and twigs, or a spice from the powdered fruit, and it is said to have some medicinal value. Ecologically, it is a host to both the Eastern Tiger Swallowtail and Spicebush Swallowtail butterfly larvae, and attracts birds with its fragrant flowers.

Common Snapping Turtle *Chelydra serpentina*

- **Family:** Chelydrae

- **Typical Habitat:** These turtles live in fresh or brackish water, and prefer muddy bottoms and abundant vegetation to aid in concealment.

- **Why it matters:** Although eggs and small juvenile turtles can be prey to many larger animals, (such as great blue herons, crows, raccoons, skunks, foxes, bullfrogs, water snakes, and large predatory fish), they are aggressive predators when larger. These turtles will eat anything they can: fish, birds, amphibians, small mammals, invertebrates, and aquatic vegetation. They are not very social and have been known to decapitate other snapping turtles.

Spotted Touch-Me-Not
Impatiens capensis

- **Family:** Balsaminaceae

- **Typical Habitat:** swamps, streamsides, ditches, lake shores, marshy areas, thickets, ravines, wet spots in forests; often in somewhat disturbed areas, including excavations

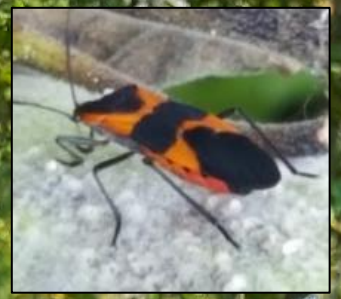
- **Why it matters:** Flowers in this genus typically provide nectar for hummingbirds, and juice from the stem can help relieve the sting from poison ivy or stinging nettle.

Boneset
Eupatorium perfoliatum

- **Family:** Asteraceae

- **Typical Habitat:** marshes, wet fields, shores, fens, conifer swamps, thickets, moist clearings, river and stream banks

- **Why it matters:** This plant also attracts important butterfly pollinators, and boneset tea can be an herbal remedy for fever. Additionally, the leaves have been used throughout history for the wrapping around a broken *bone* to *set* it for healing.



Common Milkweed
Asclepias syriaca

- **Family:** Apocynaceae

- **Typical Habitat:** dry to somewhat moist, usually sandy, often disturbed areas, shores and dunes, fields, openings in aspen and pine savannas

- **Why it matters:** Milkweed is the exclusive food of monarch butterfly larvae. These butterflies are important pollinators in the community, promoting the genetic diversity and growth of a number of key natural wildflowers.

☆**BONUS INSECT!**☆

Pictured with the plant is what is commonly called the **large milkweed bug** (*Oncopeltus fasciatus*), a hemipteran that feeds on milkweed and can sequester the plant's toxins to ward off its own predators.

Monarch Butterfly
Danaus plexippus

- **Family:** Nymphalidae
- **Typical Habitat:** These butterflies typically are found in grasslands, prairies, and meadows, relying on milkweed plants to lay their eggs.
- **Why it matters:** Although I did not see a monarch butterfly, the presence of milkweed suggests that they are around. These butterflies are important pollinators and are a food source for birds, small animals, and other insects. Their populations have been diminishing recently due to habitat loss and rising temperatures.

Nodding beggar-ticks
Bidens cernua

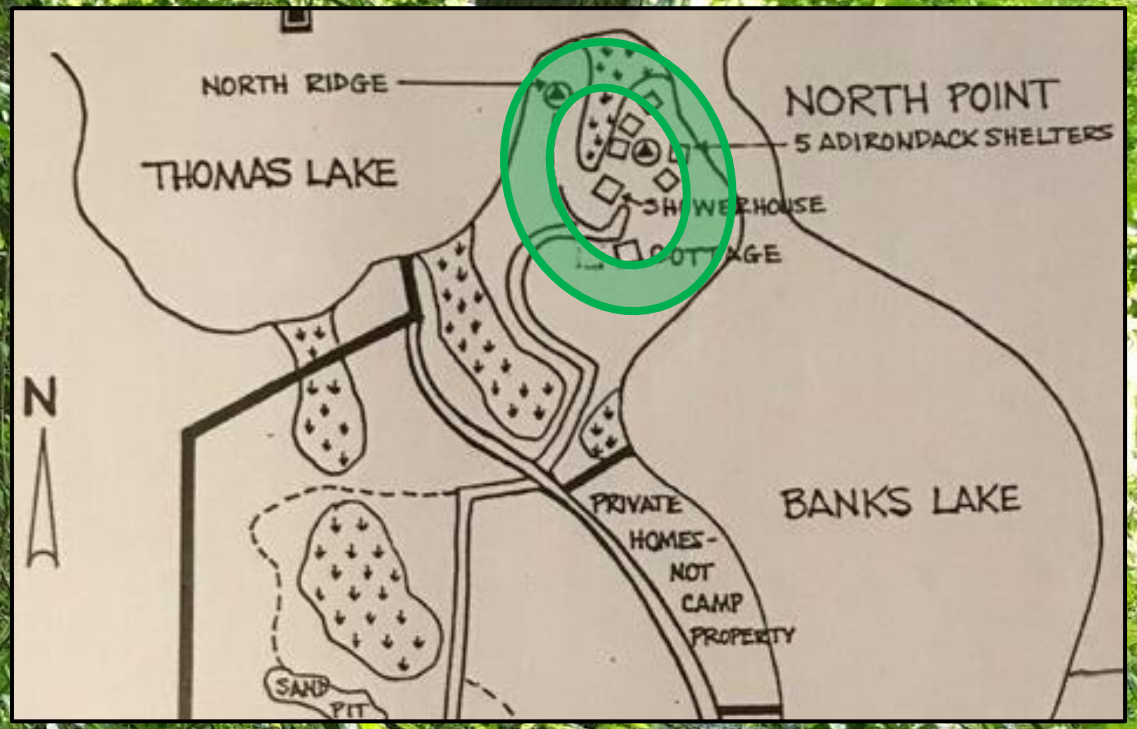
- **Family:** Asteraceae

- **Typical Habitat:** moist shorelines and muck, mudflats, depressions in forests, sedge meadows, fens and bogs, cedar swamps, ponds, ditches, and marshes

- **Why it matters:** This plant can be considered a native weed, due to its high efficiency with dispersal and pollination. It is also classified as an obligate wetland plant by the USDA, almost always found in such areas.

3. North Point Midland

I walked all around North point near the shoreline, but slightly further inwards, to take a look at the mid-level habitat zone between the marshy edge by the water and the upper inland area. The soil appeared to be rich and moist, but not swampy. This is considered a cool temperate woodland forest, with some hardwood floodplain areas, indicating that high water levels will flood the area and provide the soil with moisture and nutrients. There were many low-level understory ferns, shrubs, and woody saplings, as well as scattered trees providing shade from the upper canopy.



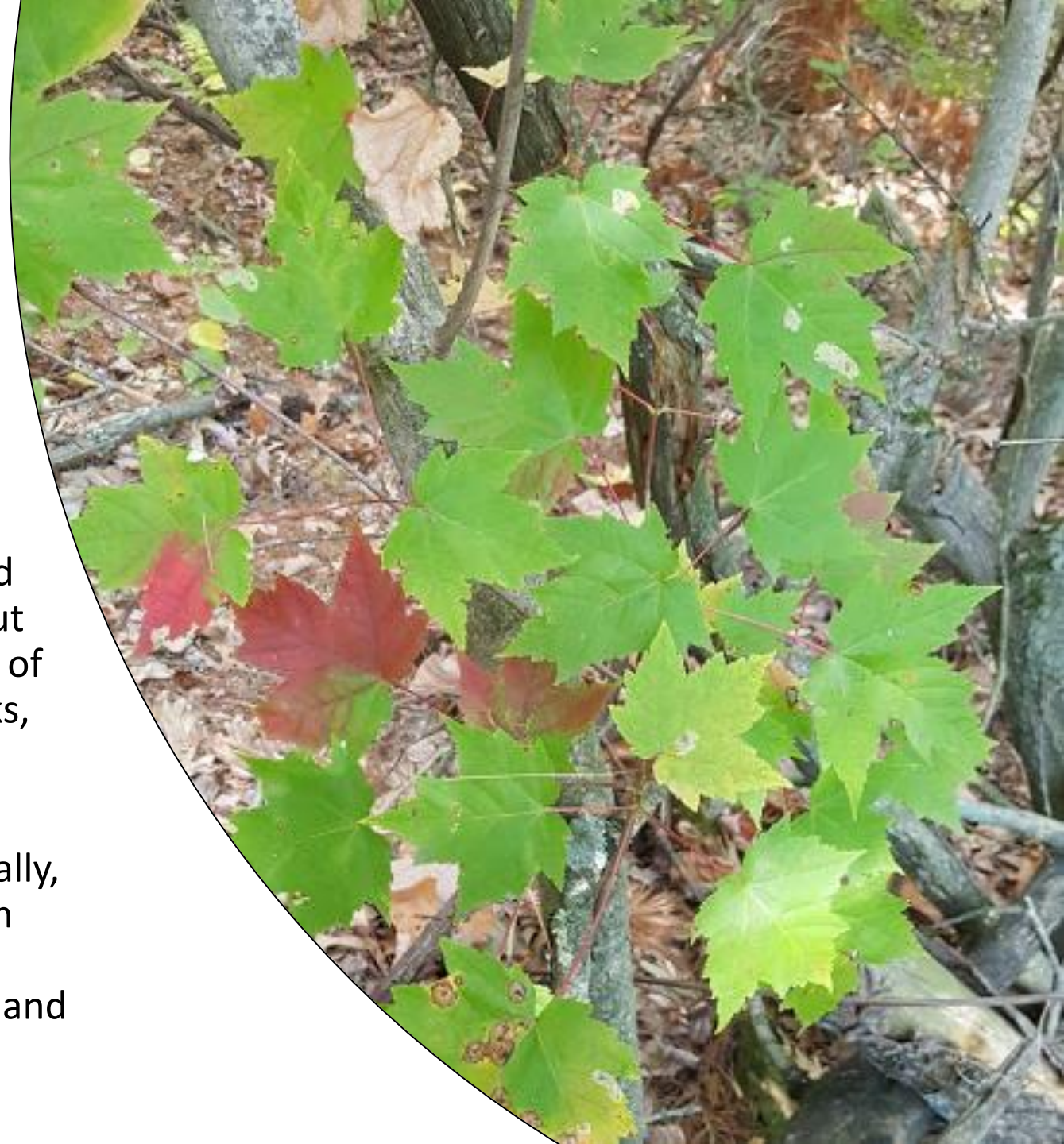
Woodfern
Dryopteris sp.

- **Family:** Dryopteridaceae

- **Typical Habitat:** cool, moist woodland areas, with full shade or partial sun

- **Why it matters:** These are important understory plants that provide microhabitat and cover for small animals, filter toxins from the environment, and can colonize disturbed areas to encourage succession.

Red Maple
Acer rubrum



- **Family:** Sapindaceae

- **Typical Habitat:** commonly in moist forests and swamps (deciduous and coniferous) throughout the state; upland forests and dry sandy forests of plains, dunes, and hills (often with aspens, oaks, and/or pines)

- **Why it matters:** This tree is popular ornamentally, due to its fast growth and beautiful red color in the fall. In the forest, the seeds are commonly stored by squirrels and chipmunks, while deer and rabbits browse the small sprouts.

Turkey Tail Fungus
Trametes versicolor

- **Family:** Polyporaceae
- **Typical Habitat:** This is one of the most common mushrooms in North American woods, found on dead hardwood logs and stumps.
- **Why it matters:** Fungi are important ecologically for their role in aiding in decomposition and nutrient cycling.

Pear-Shaped Puffball
Lycoperdon pyriforme

- **Family:** Agaricaceae

- **Typical Habitat:** Saprobic on the dead wood of hardwoods or conifers, widely distributed across North America.

- **Why it matters:** Mushrooms like this are very important, but often overlooked, aspects of any ecosystem. These feed on the decaying material of a dead organism, aiding in the decomposition process and adding the nutrients into the soil for future plants to utilize.

American Toad (or Fowler's Toad) *Anaxyrus americanas (or fowleri)*

- **Family:** Bufonidae

- **Typical Habitat:** These toads need a semi-permanent freshwater pond or shallow pool of water, and dense patches of vegetation.

- **Why it matters:** Although it is difficult to distinguish between the two species, both of these toads are considered to be vulnerable or imperiled in multiple states. They secrete *bufotoxin,* a mild poison to detract predators, and eat crickets, mealworms, earthworms, ants, spiders, slugs, centipedes, moths, and other small invertebrates.

White Oak
Quercas alba

- **Family:** Fagaceae

- **Typical Habitat:** Found in oak-hickory, beech-maple, and mixed hardwood stands; often with jack pine and other oaks on sandy plains in the northern Lower Peninsula.

- **Why it matters:** This tree provides food for many animals in its community; the acorns are gathered and eaten by birds and rodents, the leaf buds are eaten by many species of birds, and deer eat almost every part of the tree. It is also a common source of wood for the barrels in winery and whiskey distilleries across the nation.

Cushion & Broom Moss *Leucobryum glaucum & Dicranum scoparium*

- **Family:** Leucobryaceae, Dicranaceae

- **Typical Habitat:** These mosses have been found in the ground of rocky woodlands, shaded hillsides, wooded bluffs and ridges, shaded banks along creeks and rivers, and well-rotted pine logs in sandy savannas.

- **Why it matters**: The denseness of the plant provides good cover for small invertebrates, like moss mites and springtails. Mosses are important in an ecosystem, because they retain water and add stability to the ground. They are also good indicators of atmospheric pollution.

White Pine
Pinus Strobus

- **Family:** Pinaceae

- **Typical Habitat:** Often in mixed forests, but also on sandy plains and dunes with red and sometimes jack pine, bogs with tamarack, in swamps (mixed or on banks, rather than deciduous swamps or floodplains), on rock ridges, and even in cedar swamps.

- **Why it matters:** This species is the official state tree of Michigan! This has greatly been used for lumber, and the bending of these top branches can be very useful in determining wind speed and direction.

Moonseed
Menispermum canadense

- **Family:** Menispermaceae

- **Typical Habitat:** A vine climbing on various trees and shrubs in swamps, rich forests, and thickets, especially along rivers.

- **Why it matters:** The stems and foliage are a good nesting habitat for woodland birds. These birds also eat the berries and disperse the seeds for future plants, yet it is toxic to humans and other mammals.

Hog peanut
Amphicarpaea bracteata

- **Family:** Fabaceae

- **Typical Habitat:** A low vine generally of open forests and thickets, ranging from sandy oak and oak-hickory forests to lowland swamps; shores, river banks, moist areas in deciduous forests.

- **Why it matters:** The caterpillars of the Silver-Spotted and Gold-Banded Skippers feed on the leaves, as well as several species of beetles. Larger animals also eat parts of the plant, including the Ruffed Grouse, Ring-Necked Pheasant, White-Footed Mouse, Meadow Vole, and White-Tailed Deer.

Witch-Hazel
Hamamelis virginiana

- **Family:** Hamamelidaceae
- **Typical Habitat:** May be found in rich deciduous forests, but more often in sandy dry forests and savannas with oak, hickory, aspen, or pine.
- **Why it matters:** Witch-hazel is well known for its many medicinal uses. It has been used topically as an astringent to tighten skin, and ingested for the treatment of tuberculosis and cancers. Other ailments this plant can help with include, but are not limited to: itching, inflammation, varicose veins, insect bites, acne, minor burns, stings, and other general skin irritation.

The Sickener
Russula emetica

- **Family:** Russulaceae

- **Typical Habitat:** This is a mychorrizal organism, forming a mutualistic relationship with the roots of some plants, especially pines. The fruiting bodies grow in sphagnum moss near bogs, and in coniferous or mixed forests.

- **Why it matters:** This is edible, although not recommended because it causes gastrointestinal distress when eaten raw. It is known to be food for several species of slugs, fungus gnats, snails, and even red squirrels.

Wintergreen
Gaulthera procumbens

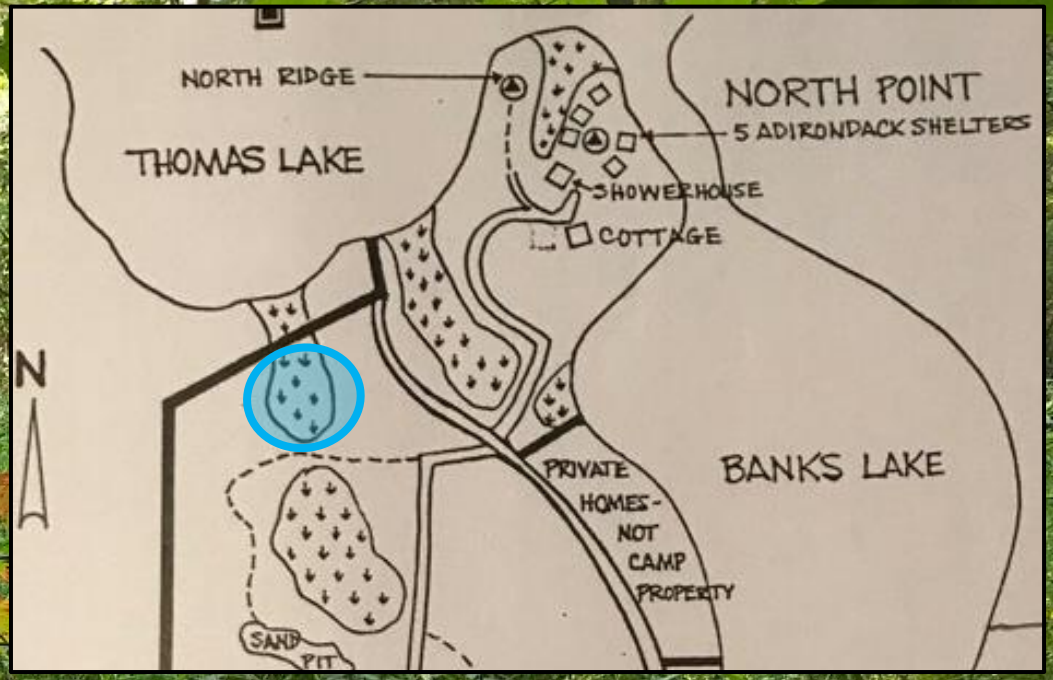
- **Family:** Ericaceae

- **Typical Habitat:** Thrives in dry areas usually with oak, pine, paper birch, aspen, red maple, bracken, blueberry; yet also frequent in moist forests, even conifer swamps; less often with beech, maple, hemlock.

- **Why it matters:** This is a species that would do well after a fire, participating in the regrowth of the forest understory. The leaves have a strong wintergreen flavor and aroma and can be used for tea.

4. By the Border

After wandering around the camp for a bit, I stumbled upon a small area with a little bridge over some mucky ground. This would be a flowing creek with a higher water level and is adjacent to Thomas Lake, bordering upon other landowners' property. I saw many small frogs, and clusters of ferns with other low plants scattered around the muck. This area is part of the floodplain system of the surrounding lakes and acts as a buffer between the open water and the inner land, softening the blow of storm surges and collecting sediment. These types of areas hold nutrients that are re-released with frequent flooding, providing a welcoming environment for many species of plants and macroinvertebrates.



Woolly Aphid Colony
Erisoma lanigerum

- **Family:** Aphidae (subfamily: Eriosomatinae)

- **Typical Habitat:** bark of young trees, particularly apple and other fruit trees

- **Why it matters:** This white fuzz on the bark looks like it could potentially be a colony of woolly aphids, an insect that sucks the fluids out of a plant for sustenance. This is a pest to the plant and could lead to stunted growth, and browning or curling of the leaves. Despite this, it is not typically a huge problem and this case does not appear to be a very severe infestation.

Western Chorus Frog *Pseudacris triseriata*

- **Family:** Hylidae

- **Typical Habitat:** Prefers marshes, meadows, swales, and other open habitats; may be found in wet woods or wooded swampy areas; will largely be found under refuges such as logs, rocks, and leaf litter.

- **Why it matters:** Many populations of these frogs have been declining in agricultural and suburban areas. Frogs are beneficial because they eat insects that are pests to humans, and are an important food source for herons, raccoons, foxes, snakes, snapping turtles, fish, and even larger frogs.

Cinnamon Fern
Osmundastrum cinnamomeum

- **Family:** Osmundaceae

- **Typical Habitat:** bogs, acid swamp forests, shrub swamps, margins of fens, usually in sandy or peaty, acidic soils; often on hummocks in very wet sites, but less commonly in deep shade

- **Why it matters:** This species is considered by the USDA to be commercially exploited in Florida and New York, and endangered in Iowa. Ferns are ecologically important because they can provide microhabitats in the understory of forests and are a source of protection and shade for small organisms.

Water horsetail
Equisetum fluviatile

- **Family:** Equisetaceae

- **Typical Habitat:** Can occur in the water, on lake shores, in slow moving streams, very wet meadows and swales, ditches, bog margins and sometimes on moist shores.

- **Why it matters:** These plants absorb heavy metals from the soil, promoting the health of degraded ecosystems. These have also been used by humans medicinally as a diuretic, and the silica that builds up in the stems has been used for sanding and scouring.

Wood Nettle
Laportea canadensis

- **Family:** Urticaceae

- **Typical Habitat:** floodplains, stream banks, moist spots in hardwood forests

- **Why it matters:** Although this plant has stinging hairs on its leaves, it is safe to eat (and highly nutritious!) when cooked. Also, the stem can be used to create a fiber that can be up to 50 times stronger than cotton.

Sensitive fern
Onoclea sensibilis

- **Family:** Onocleaceae
- **Typical Habitat:** rich, moist wetlands
- **Why it matters:** This plant is very abundant in Michigan, occurring in all but one county. It seems to be a true representation of us all in this cold Midwestern climate, with its common name due to the leaf blades shriveling up in the first light frosts of the fall.

Running Ground-Pine
Lycopodium clavatum

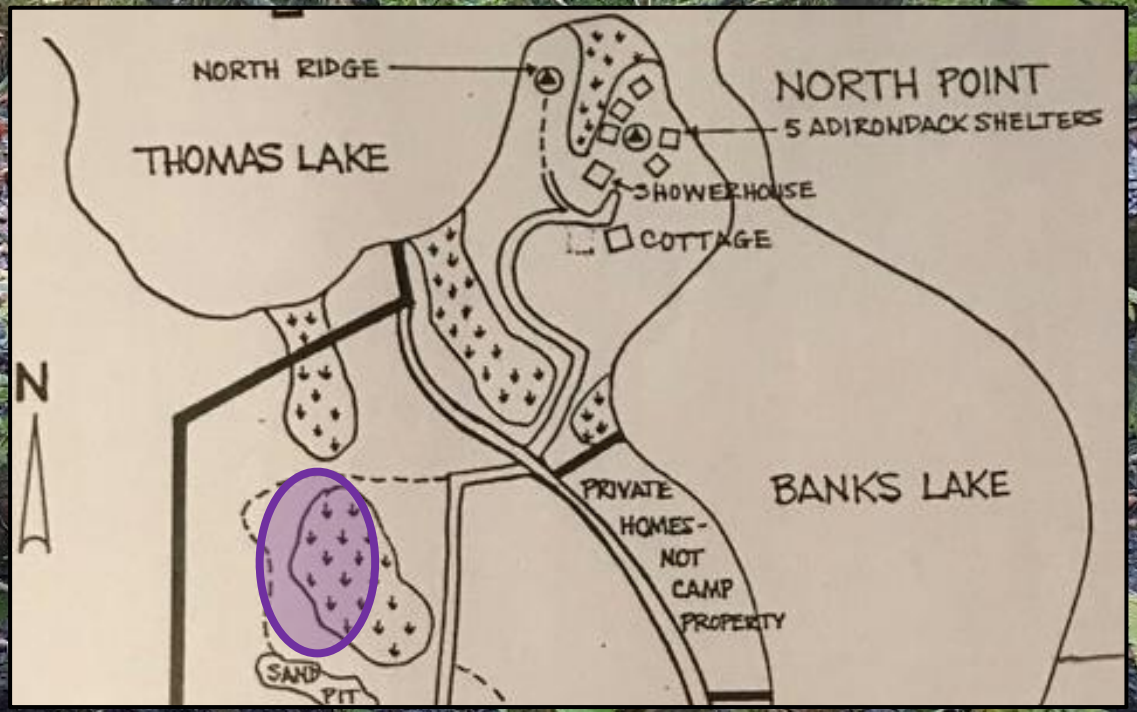
- **Family:** Lycopodiaceae

- **Typical Habitat:** dry to moist deciduous or mixed conifer-hardwood forests, usually on sandy soil

- **Why it matters**: There are many anthropogenic uses for this plant, mainly related to its water-repellant spores. They can be used as a dusting power to keep things from sticking together, as a talcum powder, for artificial lighting, or even as explosives in fireworks.

5. Southern Swamp

Similar to the other marshy areas of the camp, this zone has wet mucky soil and clusters of ferns. There were also cattails, and other relatively tall densely packed plants, with duckweed covering the ground. This area is an extension of the floodplain system in the previous section, but is farther inland and more incorporated into the forest. Although it is in the midst of this conifer mesic woodland, there is a very thick zone of low level plants the further you get into the marsh. This results in a sparse canopy in the interior of the system, allowing for much more penetrative sunlight.



Common duckweed
Lemna minor

- **Family:** Araceae

- **Typical Habitat:** Normally found floating on the surface of standing, even stagnant water of lakes, ponds, borders of streams, quiet backwaters, floodings, etc. Sometimes stranded on wet shores after lowering of water levels.

- **Why it matters:** Duckweed colonies provide habitat for micro invertebrates, yet can block the sunlight from other aquatic plants if too on the surface. Ducks eat the plant and aid in dispersal to various water bodies.

Ground-cedar
Diphasiastrum sp.

- **Family:** Lycopodiaceae

- **Typical Habitat:** These are found in moist coniferous woods, from lowlands to moderate elevations.

- **Why it matters:** Although it looks like a moss, these species are closely related to ferns. These species provide very dense ground cover for micro invertebrates and retain environmental moisture.

Sedge
Carex sp.

- **Family:** Cyperaceae

- **Typical Habitat:** wet meadows, along the margins of headwater streams and lakes and on rocky slopes that receive snowmelt

- **Why it matters:** This plant is a source of food for water and terrestrial birds, though there are conflicting reports on how large a part of their diet it is. This is also a minor source of food for both large and small mammals, and provides cover for invertebrates, small mammals, and some water birds. Sedges play a major role in stabilizing the ground near streambanks and in prairies, with 75% of their biomass estimated to be underground. Some states in the western US have even considered using sedge for natural roadside erosion control.

Broadleaf Cattail
Typha latifolia

- **Family:** Typhaceae

- **Typical Habitat:** Found in marshes, swamps, seeps, borders of rivers and ponds, ditches, and is often a dominant plant because it can survive in partially degraded habitats.

- **Why it matters:** Due to its tolerance of disturbed habitats and high concentrations of heavy metals, this species has been used in some secondary waste water treatment systems.

Royal Fern
Osmunda regalis

- **Family:** Osmundaceae
- **Typical Habitat:** bogs, acid swamp forests, shrub swamps, usually in sandy or peaty, acidic soils
- **Why it matters:** This fern often grows in thick clusters, which provides protective cover for wildlife.

Red Sorrel, Sheep Sorrel
Rumex acetosella

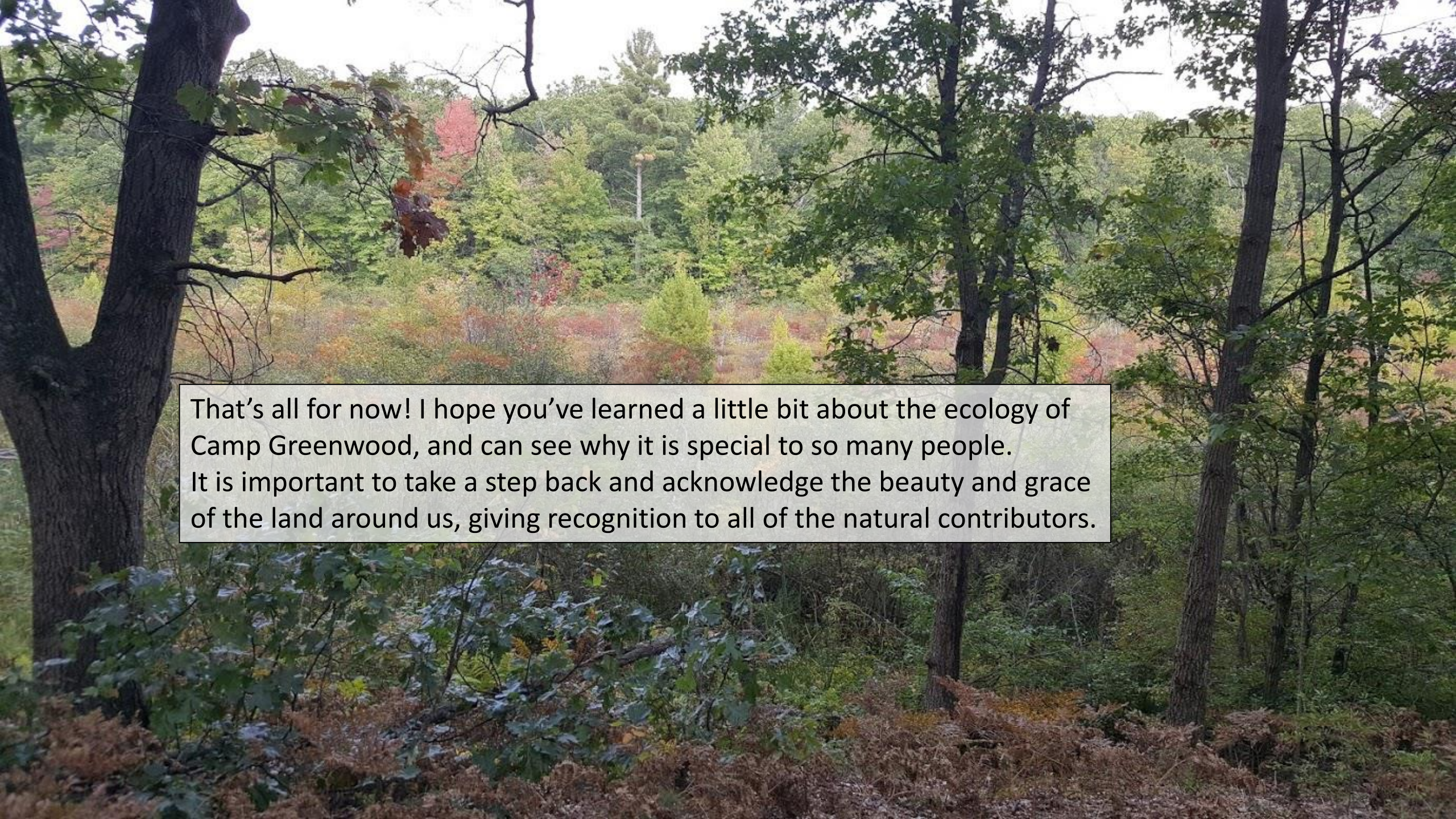
- **Family:** Polygonaceae
- **Typical Habitat:** roadsides, disturbed areas, old fields
- **Why it matters:** This is wind pollinated plant so it does not attract many insects, yet is a food source for American Copper butterfly larvae. Local birds and small mammals also eat the foliage and seeds.

Speckled Alder
Alnus incana ssp. rugosa

- **Family:** Betulaceae

- **Typical Habitat:** older zones of bogs, along lakes and streams, in extensive mucky swamps, and in all sorts of wetlands

- **Why it matters:** This tree has a symbiotic relationship with a nitrogen-fixing bacteria called actinomycetes. Nitrogen is a limiting resource in many natural communities, and being able to fix nitrogen from the air is a valuable asset. When the leaves fall and die, or when the entire plant dies, the nitrogen that has been stored is released into the soil to provide nutrients for future plants.



That’s all for now! I hope you’ve learned a little bit about the ecology of Camp Greenwood, and can see why it is special to so many people.
It is important to take a step back and acknowledge the beauty and grace of the land around us, giving recognition to all of the natural contributors.

Disclaimer! **This is just the tip of the iceberg, these images were only taken over one weekend in the fall.* Many plants were dead, dormant, or not blooming at the time and therefore difficult to identify. This study really is merely a glimpse into what is present, and ideally will be continued on by me or others in different seasons and areas of the camp. Also, I am not an expert! Some of the ID's might be wrong, and I encourage critical examination and future editing.**

Additionally, I did not account for many of the insects, birds, amphibians, reptiles, small mammals, or other organisms that surely are active and highly important aspects of the overall ecosystem.

*All pictures were taken at Camp Greenwood within the outlined study area on September 16th & 17th, 2017, with the exception of the water lily and monarch butterfly. The image of the water lily was taken at a different part of camp, Hayes Point, in August 2015. The monarch butterfly was not directly found in the camp, but the presence of milkweed is indicative that they could be seen in the future.


Some of the species I couldn’t identify… maybe you should give it a try!


Special thanks to:
Mary Parr & Lauren Meyers
Dr. James Dunn
Suzanne & Jim Bates
Michael & Julie Noteboom
Camp Greenwood Ministries

References

Arbor Day Foundation, 2018. “White Oak: *Quercus alba*”. Retrieved from <https://www.arborday.org/trees/treeguide/TreeDetail.cfm?ItemID=883?

Australian Government. Department of the Environment and Energy. “About Wetlands”. Retrieved from <http://www.environment.gov.au/water/wetlands/about>

Bebeau, G.D. 2014. “Water Horsetail”. The Friends of the Wild Flower Garden, Inc. Retrieved from <http://www.friendsofthewildflowergarden.org/pages/plants/waterhorsetail.html>

Biodiversity Information System for Europe, 2010. “Wetlands”. Retrieved from <https://biodiversity.europa.eu/topics/ecosystems-and-habitats/wetlands>

Bosch, A. 2003. “Chelydra serpentina”. Animal Diversity Web. University of Michigan Museum of Zoology. Retrieved from <https://animaldiversity.org/accounts/>

Bush, G. 2013. “Mysterious Mosses”. Michigan Gardening Magazine. Retrieved from <www.statebystategardening.com/state.php/mi/print/mysterious_mosses/>

Camp Greenwood, 2018. “Greenwood History”. Retrieved from <http://campgreenwood.org/about-camp-greenwood/greenwood-history/>

Charter, K., and Ellis, E. 2011. “Tent Caterpillars are for the Birds”. Conservation Resource Alliance. Retrieved from <https://www.rivercare.org/news/tent-caterpillars-are-for-the-birds>

Clear Communications Group Inc., 2014. Hiking Michigan. “Michigan Ferns”. Retrieved from <http://www.hikingmichigan.com/PDFinfo/MIFerns.pdf>

Fulbright, D. 2010. “Blue spruce needle cast disease”. Michigan State University Extension, Department of Plant Pathology. Retrieved from <http://msue.anr.msu.edu/news/blue_spruce_needle_cast_disease>

Gifting Inc. 2018. The Flower Expert. Retrieved from <www.theflowerexpert.com>

Hilty, J., 2017. Illinois Wildflowers. Retrieved from <www.illinoiswildflowers.info>

iNaturalist. Retrieved from <www.inaturalist.org>

Integrated Taxonomic Information System (IT IS), 2018. Retrieved from <https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=207303#null>

Kanuckel, A. 2016. “Fun Facts About Spring Peepers”. Farmers’ Almanac. Retrieved from <https://www.farmersalmanac.com/facts-about-spring-peepers-24077>

Kuo, M., 2018. MushroomExpert.com. Retrieved from <www.mushroomexpert.com>

References, cont.

Michigan Department of Environmental Quality, 2018. Michigan's Rare Wetlands. Retrieved from <http://www.michigan.gov/deq/0,4561,7-135-3313_3687-100355--,00.html>

Michigan Department of Natural Resources, 2018. "Frogs and Toads". Michigan.gov. Retrieved from <http://www.michigan.gov/dnr/0,4570,7-350-79135_79218_79616_83198---,00.html>

Michigan.gov, 2014. "Michigan Native Frogs and Toads". State of Michigan Open Data. Retrieved from <https://data.michigan.gov/Environment/Michigan-Native-Frogs-And-Toads/7ge4-fmsi/data>

Minnesota Wildflowers.info, 2018. "*Impatiens capensis* (Spotted Touch-me-not)". Retrieved from <https://www.minnesotawildflowers.info/flower/spotted-touch-me-not>

Miranda, C. 2016. "Woolly Aphids: What's that Fluffy White Stuff on my Tree?" Dengarden, Gardening, Garden Pest Control. Retrieved from <https://dengarden.com/gardening/Woolly-Aphids-Whats-that-Fluffy-White-Stuff-on-my-Tree>

Missouri Botanical Garden. Retrieved from <www.missouribotanicalgarden.org>

MSU Extension. Michigan Natural Features Inventory. <https://mnfi.anr.msu.edu/>

Motivans, K., Apfelbaum, S., and Mro. 2014. "Typha Latifolia: Habitat". NatureServe. Retrieved from <http://eol.org/pages/526590/details>

National Geographic Partners, LLC. 2018. Retrieved from <https://www.nationalgeographic.com/animals>

Natural Heritage and Endangered Species Program, Division of Fisheries & Wildlife, 2016. *Classification of Natural Communities of Massachusetts.* White Pine-Oak Forest. <https://www.mass.gov/files/documents/2016/08/qk/white-pine-oak-forest-fs.pdf>

NatureServe, 2017. "Ecological System Comprehensive Report". Retrieved from <http://explorer.natureserve.org/servlet/NatureServe?searchSystemUid=ELEMENT_GLOBAL.2.784935>

Net Industries and its Licensors, 2018. "Bryophyte – Importance of Mosses". Retrieved from <http://science.jrank.org/pages/1051/Bryophyte-Importance-mosses.html>

Plants For A Future, 2012. "Laportea canadensis – (L.) Wedd. Retrieved from <https://www.pfaf.org/user/Plant.aspx?LatinName=Laportea+canadensis>

San Diego Zoo Global, 2018. "Wood Fern". Animals and Plants. Retrieved from <http://animals.sandiegozoo.org/plants/wood-fern>

References, cont..

Shealers, D. A.; et al. (July 1999). "Foraging patterns of Eastern gray squirrels (Sciurus carolinensis) on goldenrod gall insects, a potentially important winter food resource". The American Midland Naturalist. 142 (1): 102–109. doi:10.1674/0003-0031(1999)142[0102:FPOEGS]2.0.CO;2. ISSN 0003-0031.

Sierra Club BC. "Ecosystem 101: The Role of Ferns. Retrieved from <https://sierraclub.bc.ca/ecosystem-101-the-role-of-ferns/>

Texas A&M AgriLife Extension, 2018. "Common Duckweed". Department of Wildlife and Fisheries Sciences. Retrieved from <https://aquaplant.tamu.edu/plant-identification/alphabetical-index/common-duckweed/>

The Editors of Encyclopaedia Britannica. 2017. "Boneset". Retrieved from <https://www.britannica.com/plant/boneset>

The Nature Conservancy, 2018. Journey with Nature: Autumn Olive. Retrieved from <https://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/indiana/journeywithnature/autumn-olive.xml>

The Ohio State University. "*Pachysandra terminalis*" Retrieved from <https://hvp.osu.edu/pocketgardener/source/description/pa_nalis.html>

The University of Texas at Austin, 2013. Lady Bird Johnson Wildflower Center. Retrieved from <www.wildflower.org/plants>

University of Michigan Herbarium. Michigan Flora Online. Retrieved from <www.michiganflora.net>

USDA Natural Resources Conservation Service, 2018. Retrieved from <www.plants.usda.gov>

USDA, U.S. Forest Service. Retrieved from <www.fs.fed.us>

U.S. Department of the Interior. "Pollinators – Monarch butterfly". National Park Service. Retrieved from <https://www.nps.gov/articles/monarch-butterfly.htm>

USEPA, 2000. Principles for the Ecological Restoration of Aquatic Resources. EPA841-F-00-003. Office of Water (4501F), United States Environmental Protection Agency, Washington, DC. 4 pp. Retrieved from <https://www.epa.gov/wetlands/principles-wetland-restoration>

WebMD LLC, 2018. "Witch Hazel". Retrieved from <https://www.webmd.com/vitamins-supplements/ingredientmono-227-witch%20hazel.aspx?activeingredientid=227&activeingredientname=witch%20hazel>